

## Gynandromorph of *Parnassius apollo niesiolowskii* KRZYWICKI, 1963 from the Polish Tatra Mts.

(Lepidoptera, Papilionidae)

by

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**Abstract:** A gynandromorph of *Parnassius apollo* (LINNAEUS, 1758) from the Tatra Mountains, Poland, is described (col. pl. 1: 1, 1a). The literature regarding gynandromorphy in *Parnassius* is reviewed and compared to the occurrence of this phenomenon in other Macrolepidoptera.

**Preface:** Gynandromorphism is a rare genetic anomaly in insects. (FRIAUF, 1947; GLOYD, 1971; NILSSON, 1968; SIKORA & EICHLER, 1941; SKIERSKA, 1969).

A relatively large number of publications describing this phenomenon in butterflies (see ALBERTI, 1924, 1950; BERGMANN, 1952, 1955; BERTKAU, 1889; GEIGER, 1987; HAGEN, 1861, 1863; LE MOULT, 1962; MIKULA, 1960; PAX, 1915; SCHRÖEDER, 1963; SCHULTZ, 1904; SCHÜTZE, 1951; WARNECKE, 1942) - in comparison with other groups of insects, can be explained by the easily observed mutations and by the concerns of numerous entomologists studying this phenomenon.

Results of the studies of the gynandromorphism while implementing the UV rays were published by NEKRUTENKO (1965, 1965a) followed by DĄBROWSKI & SKALSKI (1968, 1971).

Individual gynandromorphs exhibit morphologic features not typically found in other members of their species.

This refers particularly to the morphological changes within the genitals, where the differences in dominance of the ♂ and ♀ features are unique and characteristic to the given specimen (DĄBROWSKI, 1967; 1971; DĄBROWSKI & SKALSKI, 1967, 1968, 1971; LE MOULT, 1962; SLABÝ, 1950).

**Matter:** The studied specimen from the Polish Western Tatra Mts. was discovered on the south facing slope of Žar Mountain (at the altitude of approximately 1500 m a.s.l., August 18, 1938, Leg. ANTONI RUDKOWSKI).

At this time it was the largest site of this species in the Polish Tatra Mts., where yet at the beginning of the 1950 more than eight hundred of flying specimens were observed in one day (KRZYWICKI, 1963). The systematic intensive artificial afforestation of the xerothermic gullies continuously carried out in the 1950's by the Tatra Mts. National Park, despite the warnings and the protests of lepidopterologists, resulted in their degradation.

*Parnassius apollo niesiolowskii* KRZYW. died out from the last known sites at the Kościeliska and Chochołowska valleys in the Polish Tatra Mts. at the end of the second half of the last century (DĄBROWSKI, 2007, 129 p., DĄBROWSKI, 2008).

KRZYWICKI (1963) recognizes from the High Tatra Mts. presence of three endemic subspecies *P. apollo* (L.):

- 1.) *candidus* VERITY, 1912 - from the Belanske Tatry Mts. (Slovakia),
- 2.) *niesiolowskii* KRZYWICKI, 1963 - from the western portion of the Polish West Tatra Mts.,
- 3.) *liptauensis* PESCHKE & ELSNER, 1922 - from the south facing slopes of the High Tatra Mts. (Slovakia).

*Parnassius apollo niesiolowskii* KRZYW., described from the Polish Tatra Mountains, is most similar to *P. apollo candidus* VERITY from the Belanske portion of the Tatra Mountains, and the two subspecies occurred in similar biotopes. For this reason the diagnostic characters separating these taxa are described and illustrated (Table 1; figs. 1-6).

Currently it is considered to be an extinct subspecies in Poland. The individual adult butterfly specimens casually flying from the Slovakian Tatra Mts. are now not finding suitable habitats in the Polish portion of the Tatra Mts. which would allow establishing new lasting populations.

Table 1. The dimensions of the gynandromorph of the *P. apollo niesiolowskii* KRZYW.

| Dimensions in millimeters  | ♂ left side | ♀ right side |
|----------------------------|-------------|--------------|
| Forewing's wingspan        |             | 67,5 mm      |
| The length of the forewing | 38,1 mm     | 37,2 mm      |
| The length of the hindwing | 30,4 mm     | 29,2 mm      |
| Length of the abdomen      |             | 12,3 mm      |

Dimensions in the millimeters

Left ♂ side - the measurement of the forewing is approximately 0.9 mm longer than the right side featuring the ♀.

Analogously the hindwings are approximately 1,2 mm larger on the ♂ side. The specimen has on its forewing's inner scent ridge black spots, a centrally situated congregation of red scales and a similar small red spot within the black spot of its shoulder ridge

situated below it. These are features characteristic to specimens belonging to trans. ad ab. *pseudonomion* CHRISTOPH, 1873. The dimensions of the described gynandromorph are somewhat smaller than in the usual specimens inhabiting the same site - where the average forewing's wingspan is in the ♂: 68-72mm [average of 69.7mm], and in the ♀: 74-80mm [average of 75.6mm] (KRZYWICKI, 1963, 1982).

The design of the wings is analysed by the method (SZWANWICZ, 1956, fig. 355). In *Parnassius* it is characterized usually by lack of the second „ekstremy“, the third again is heavily widened and separated by a blue band, from which it's derived name sky-blue [Glauca - G]. Characteristic is the presence of three red bands [Rubrae – R1, R2, R3] originating from shadows and a reduction of the inner formation, particularly on the forewing.

In *Parnassius apollo* (L.) the design of the wings (SZWANWICZ, 1956, fig. 335 A, a) the first ekstern and the sky-blue band are much faintly pigmented; fragments R1 on the hindwing admitted form of the red with black and white spots, the inner formation is reduced, again discoidal bands of the forewings are heavily developed.

In the accepted chart 3) the wing design of the studied Gynandromorph (fig. 1.) emphasizes its bilateral sexual dimorphism.

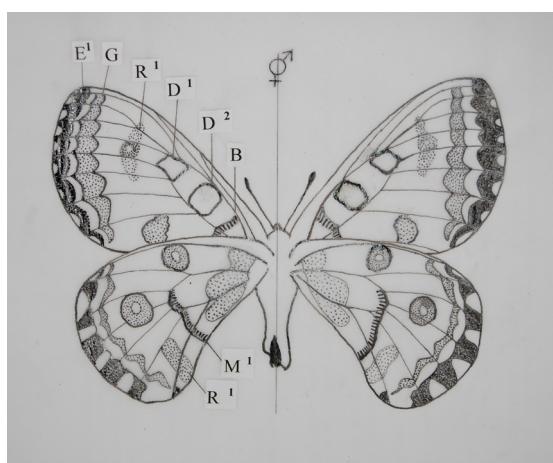


Fig. 1: Gynandromorph of *Parnassius apollo niesiolowskii* KRZYWICKI, 1963 - chart of the wing design, ventral view.  
B - Basalis; D1 - Distalis first; D2 - Distalis second; E1 - Extreme first; G - Glauca [= E3]; M1 - Medialis: first median band; R1 - Rubrae: first. Original (Explain according to SZWANWICZ, 1956, Fig. 341 and Fig. 355 A, a).

**Discussion:** SCHULTZ (1904) in the record (census) of gynandromorphic Macrolepidoptera lists for the genus *Parnassius* 12 specimens belonging to 3 species, threin *P. apollo* (L.).

KOTZSCH (1936/1937) described a gynandromorphic specimen of *P. autocrator* (AVINOFF, 1913) presenting its appearance on a color plate. In respect to the oneness of this piece of literature we are placing portion of the plate featuring the mentioned gynandromorphic specimen. The author did not place an illustration of the described specimen. According to the description we can assume, that it was most likely a bilateral gynandromorph (col. pl. 1: 4) In case of doubtfulness, the final check may be only the morphological analysis of the genitals.

A comprehensive description of the habitus of a gynandromorphic specimen of *P. apollo* (L.) from the Polish Tatra Mts. is placed by NIESIOLOWSKI (1929: 32-33): „Dr. FUDAKOWSKI captured on the 7th of August, 1923 in the Kościeliska Valley a specimen, where its left side is of a ♂, right again is of a ♀. The specimen is small, with its wingspan measured barely 68mm. Its ♂ left forewing is of an absolutely usual design; the pellucid edge („Glassaum“) reaches the Cu2. The submarginal band of the hindwings distinct (strong), exterior edge at the veins influx darkly dusted, anal spots small. Its female's right forewing is also of a usual design, but in ♀ the black spots are, except for the discal spot, always slightly larger, compared with the left side; edge pellucid, wider reaching as far as the scent edge; dusting of the wings substancially stronger.

On the hindwings the submarginal band heavily marked, exterior edge, very strongly broadly darkened, composed with large, pellucid halfmoons between the veins; median eye spot strongly larger compared with the left wing, anal spots large, black, lower cubical with red tint, general dusting considerably stronger comparing with the male's left wing. Left male's side of the abdomen strongly haired, right side again considerably of a female, almost without any hair; sphragis is missing; herewith probably a pseudo-hermaphrodit.“

In the copy of the cited catalogue, which was sent to the author by LEO SHELJUZHKO, are found numerous handwritten supplemental appendices made by him. Generally in addition to the 463 gynandromorphic specimens belonging to the Rhopalocera listed in this catalogue, 180 were added, whereas the species of *P. apollo* (L.) was supplemented by 2 gynandromorphic specimens.

#### References

ALBERTI, B. (1924): Zwitterbildung bei *Erebia aethiops* Esp. (Lep., Satyr.). - Z. Wiss. Ins. Biol. **19**: 194, Berlin.  
ALBERTI, B. (1950): Bemerkenswerte Häufung eines Zwittervorkommens. - Ent. Z. **60** (11): 81-82, Frankfurt a. M.  
BERGMANN, A. (1952): Die Großschmetterlinge Mitteldeutschlands **2**: 108-112. - Urania-Verlag, Leipzig & Jena.

BERGMANN, A. (1955): Die Großschmetterlinge Mitteldeutschlands **5** (2): 1120. - Urania-Verlag, Leipzig & Jena.

BERTKAU, P. (1889): Beschreibung eines Zwitters von *Gastropacha quercus* nebst allgemeinen Bemerkungen und einem Verzeichnis der beschriebenen Arthropodenzwitter. - Arch. Naturgesch. **1**: 55, Berlin.

BRČAK, J., 1951. Příspěvek k poznání motýlů vysokých Tatér, Čas. Českoslov. - Spol. Ent. **48** (3): 167-178, Praha.

DĄBROWSKI, J. S. (1967): Gynandromorphs of *Lycaides argyrogynon* (BERGSTR.). - Coridon A **7**: 1-6, 18 figs., 2 plates, Bucks, England.

DĄBROWSKI, J. S. (1971): Ein Fall von Gynandromorphismus bei *Zygaena carniolica* SCOP. (Lep., Zygaenidae). - Ent. Nachr. **15**: 124-127, 1-2 Abb., Dresden.

DĄBROWSKI, J. S. (2007): Burnets (Lepidoptera: Zygaenidae) in the Tatra Mts., Podhale region, Mt. Babia Góra region, and Pieniny Mts. - Nowy Pam. Fizjogr. **5** (2006), (1-2): 107-136, 2 taf., Warszawa.

DĄBROWSKI, J. S. (2008): Ups and downs of *Parnassius apollo* L. (Lepidoptera: Papilionidae) in the Tatra National Park/Poland and problems of its reintroduction. - Atalanta **39** (1-4): 327-336, 1-3 figs., 23/1-7a Colour pls., Würzburg.

DĄBROWSKI, J. S. & A. W. SKALSKI (1967): Beiträge zum Gynandromorphismus bei Schmetterlingen III: Über Gynander von *Argynnis paphia* L. (Lep., Nymphalidae). Dt. Ent. Z. (N. F.) **15** (4/5): 431-444, 1-14 Abb., 1 Tab., 1 Taf., Berlin.

DĄBROWSKI, J. S. & A. W. SKALSKI (1968): The casus of gynandromorphism in *Gonepteryx rhamni* (L.) (Pieridae). The materials to the knowledge of Gynandromorphism in Lepidoptera, part. II. - Acta Musei Silesiae Ser. A **17**: 77-80, 1-6 figs., Opava.

DĄBROWSKI, J. S. & A. W. SKALSKI (1971): A study in Lepidoptera Gynandromorphism. - Proc. XIII Int. Congr. Ent., Moscow, 2-9 August 1968, "NAUKA" **1**: 239-240, 1-9 figs., Leningrad.

FRIAUF, J. J. (1947): Notes on two Orthopteran Gynandromorphs. - Univ. of Michigan, Occasional Papers of the Museum of Zoology **50**: 1-4, I-II plates., Michigan.

GEIGER, W. [Red.] (1987): Tagfalter und ihre Lebensräume-Arten-Gefährdung-Schutz. - Schweiz. Bund Natursch. **1**: I-XI + 1-516, 1-25 taf., Basel.

GLOYD, L. K. (1971): Gynandromorphism in the Odonata. - Mus. of Zool., Univ. of Michigan, The Michigan Ent. **4** (3): 93-94, Michigan.

HAGEN, H. (1861): Insektenzwitter. - Stettin. Ent. Z. **22**: 259-286, Stettin.

HAGEN, H. (1863): Insektenzwitter. - Stettin. Ent. Z. **24**: 189-195, Stettin.

KRZYWICKI, M. (1963): Przyczynek do znajomości fauny Rhopalocera Tatr polskich. - Ann. Zool. **21**: 151-222, Warszawa.

KRZYWICKI, M. (1982): Monografia motyli dziennych Polski Papilioidea i Hesperioidea (Lepidoptera): 1-364, 5 map, 4 tab., 17 tabl. [typescript], Lublin.

KOTZSCH, H. (1936/1937): *Parnassius autocrator* eine eigene Art. - Ent. Rundsch. **54** (5): 50-52, I. Farbtafel, Stuttgart.

MIKULA, L. (1960): U sběratele motýlů v pralesích Guineje. - Věšmir **39** (1): 28-30, Praha.

LE MOULT, E. (1962): Quelques cas de gynandromorphisme chez des Rhopaloceres. - Bull. Biol. Fr. Belg. **46**: 177-184, Paris.

NEKRUTENKO, Y. P. (1965): „Gynandromorphic Effect” and the Optical Nature of Hidden Wing-pattern in *Gonepteryx rhamni* L. (Lepidoptera, Pieridae). - Nature **205**, N0. 4969: 417-418, St. Alban, England.

NEKRUTENKO Y. P. (1965a): Three cases of Gynandromorphism in *Gonepteryx*: an observation with ultraviolet rays. - J. Res. Lep. **4** (2): 103-108-, 1-5 figs., Arcadia, California, USA.

NILSSON, B. (1968): A gynandromorph of *Oxylipeurus mesopelios* (NITZSCH) (Mallophaga) from *Phasianus colchicus* L. - Opuscula Ent. **33** (1-2): 80-81, 1 fig., Lund.

NIESIÓŁOWSKI, W. (1929): Motyle większe Tatr Polski, Prace Monogr. - Kom. Fizjogr., Pol. Akad. Umiej. **5**: 1-88, Kraków.

PAX, F. (1915): Über einige Lepidopteren-Zwitter. - Schlesische Insektenkunde zu Breslau (Früher: Zeitschr. für Ent.) Heft **8**: 13-15, Breslau.

SIKORA, H. & W. EICHLER (1941): Ein "Zwitter" beim Taubenfederling *Columbicola c. Columbae* L. - Mitt. Dt. Ent. Ges. **10** (7/8): 71-73, Berlin.

SKIERSKA, B. (1969): Case of gynandromorphism in *Aedes (Ochlerotatus) excrucians* (WALKER, 1856) (Diptera, Culicidae). - Bull. Ent. Polonie **39** (2): 401-406, 2 figs., Wrocław.

SLABÝ, O. (1950): The copulatory organs of a gynandromorphous *Argynnis paphia* L. and discussion about its development. - Čas. Česk. Spol. Ent. **47** (3): 1-16, 1-19 figs., Praha.

SCHRÖDER, H. (1963): Ein Gynander von *Maniola jurtina* LINNAEUS (Lep., Satyridae). - Ent. Z. **73** (6): 66-68, Stuttgart.

SCHULTZ, O. (1904): Übersicht über die bisher bekannt gewordenen Fälle von Gynandromorphismus bei paläarktischen Macrolepidopteren nach Familien, Gattungen und Species. - Allgemein. Z. Ent. **9** (15/16): 304-310, Neudamm.

SCHULTZ, O. (1941): Gynandromorphe Makrolepidopteren der paläarktischen Fauna VI. - Ent. Z. **25**: 1-51, Frankfurt a. M.

SCHÜTZE, E. (1951): Ein geteilter Zwitter von *Epinephele jurtina* HBN. - Ent. Z. **61**(6): 47-48, 2 photos., Frankfurt a. M.

SWANWICZ, B. (1956): Entomologia ogólna, [translated according to: Шванвич Б. Н., 1949. Курс общей энтомологии, Издательство "Советская наука", Москва – Ленинград], Polish edition (authorized reprint): PWRIŁ, 1-992 pp, 1-590 figs., Kraków.

WARNECKE, G. (1942): I. Über geschlechtsgebundene Farbungsunterschiede bei Eulenschmetterlingen. II. Zwei bemerkenswerte Falter von *Agrotis pronuba* L. (Lep. Noct.) 1. Ein Zwitter. 2. Eine durch Schuppenbildung veränderte Form. - Z. Wien. Ent. Ver. **27**: 249-256, Taf. 23-24, Wien.

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